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## A prospective study on frontline demonstration of banana value added products

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### Abstract

Bananas are perishable agricultural products with a limited shelf life after harvest. The shelf life can be extended through several common practices. The availability of bananas year-round increases the opportunity for small or large-scale processing units, which benefits farmers. Bananas can be stored at room temperature for 2-3 days without deterioration. Improving processing technology and standardizing products can help better utilize bananas, especially in off seasons. Processed products made from bananas can be stored for longer periods, increasing farmer income and reducing marketing risks. This study focuses on changing traditional methods of selling raw bananas by encouraging farmers to participate in food processing techniques, such as making dried and value-added products like banana powder, figs, squash, nutrimix, and pickles. This study highlights the difference in profit between selling Bananas with and without processing, providing a profitable opportunity for rural and urban farm women.

**Keywords:** bananas, value added products, cost benefit ratio, shelf life study, and doubling farmers income

### Introduction

India is the top producer of bananas and most of the bananas grown there are consumed domestically. Although over half of the bananas produced in India are Cavendish cultivars, the major growing states are located in the North-Eastern and Southern regions. Tamil Nadu has the largest banana cultivation area and ranks first in production, followed by Maharashtra. However, Maharashtra has the highest productivity, followed by Tamil Nadu and Madhya Pradesh. In Tamil Nadu, the major banana growing districts include Erode, Coimbatore, Trichy, Tirunelveli, Tuticorin, and Kanyakumari <sup>[1]</sup>. The banana crop is grown on 5728 hectares of land in the Tirunelveli district before bifurcation, and the cropping season is mostly from April to May. In this study, we have selected the Grand 9 bananas.

The price of bananas at the farm gate varies from Rs.15 to 25 per kilogram, depending on the variety. Bananas are considered an essential "protective food" due to their high nutritional value. They are highly versatile and widely used in Indian cooking. Bananas are used in baking as a softening and binding agent for cakes, muffins, desserts, cookies, jam, jelly, candy, figs, powder, nutrimix, squash, pickles and many other applications. As a result, they have few competitors in the value-added processing chain.

Bananas are rich in potassium, magnesium, copper, manganese, and vitamin C, but low in iron and vitamin A Wall, M.M, 2006 <sup>[2]</sup>. Processing and value-addition are crucial for improving farmers' income. Unfortunately, there is a lack of awareness about the benefits of processing bananas due to the under-reporting of related studies. The dried form of bananas is used as a raw material for various commercial products, including as a softening and binding agent and ingredient for functional foods. They are also consumed directly all over the world. Keeping this in mind, the ICAR-KVK-Tirunelveli in the Tenkasi district of Tamil Nadu conducted frontline demonstrations on value-added banana products among banana cultivating farmers to promote entrepreneurship activities.

### Material and Methods

The study was conducted by ICAR Krishi Vigyan Kendra in Tirunelveli from November 2021 to July 2022. 20 farmers, selected randomly from the Banana cultivators of Tenkasi district in Tamil Nadu, participated in the training. The hygienic preparation of Banana Fig, Powder, Nutrimix, Squash, and Pickle was demonstrated to the farmers, who then practiced individually.

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Grand 9 Bananas (grown from April to May) were chosen for the study, and the parameters of Gross income, Gross cost, and Net income for each value-added product were calculated using scientific methods.

**Raw materials:** The raw material for the study, Bananas, were procured from the local markets of Surandai in the Tenkasi district, known for its abundant fruit and vegetable cultivation, and were handled with care and hygiene before being transported to ICAR KVK in Tirunelveli (Tenkasi).

**Procedure for preparation:** The pre-treatment procedure involved soaking the purchased Bananas in a 2% salt water solution for 10 minutes, then cleaning them with drinking water and wiping with a cloth. The outer skin was peeled prior to this. For most processing procedures, the Bananas were subjected to blanching, which involved boiling them for 5 to 7 minutes and immediately rinsing with cold water before drying or preparing value-added products.

**Banana Fig preparation method:** The method for preparing banana fig involved peeling the outer skin, blanching the peeled bananas, slicing them into 3mm thickness pieces, and drying them in a solar dryer for 8 hours at 60-65 °C.

**Banana Powder preparation method:** The process for making banana powder involves soaking the bananas in a 2% salt water solution for 10 minutes, washing them, and wiping them with a cloth. The outer skin is removed and the bananas are sliced into 3mm thickness. These slices are then dried in a solar dryer at 55 °C for 6 hours and finally ground into powder. From 500kg of fresh bananas, approximately 50kg of dry banana powder can be produced.

**Banana Squash preparation method:** The method for preparing banana squash involves blanching the bananas and removing the outer skin. The bananas are mashed and mixed with sugar, water, and banana sauce in a ratio of 4:1:1. The

mixture is boiled until the sugar dissolves, and then 5% cardamom powder is added until the mixture reaches a 40° Brix. Finally, 1.5% citric acid is added and stirred, then the mixture is filtered and stored after cooling.

**Banana Nutrimix preparation method:** For the Banana nutrimix preparation, the Bananas were first treated by soaking in a 2% salt water solution for 10 minutes, then cleaned with drinking water and dried with a cloth. The outer skin was then peeled and the Bananas were sliced into 3mm thickness, placed in a tray and dried in a solar dryer at 55 °C for 6 hours. The dried slices were then ground into powder, yielding 50kg of powder from 500kg of fresh Bananas. To this 500g of Banana powder, add 125g of Ragi, Bajra, Sorgham flour and Roasted Bengal gram flour were added each.

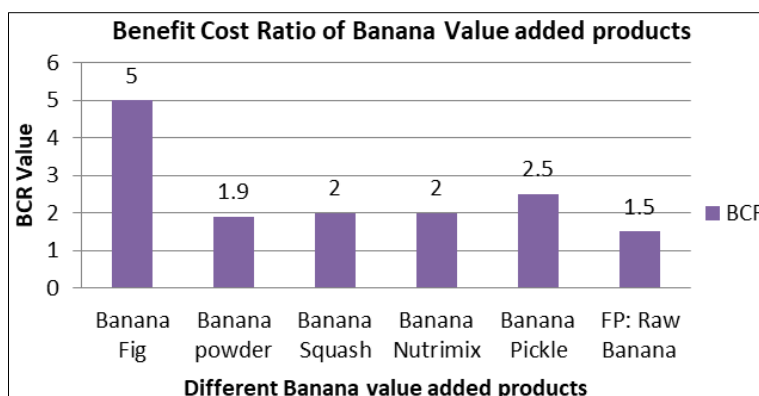
**Banana pickle preparation method:** The banana pickle preparation method involves pre-treating the bananas by soaking them in a salt water (2%) solution for 10 minutes, then washing and wiping them with cloth. The bananas are then cut into small cube pieces, and cooked in gingelly oil (20%) for 20 minutes. The cumin seeds, dry chillies, garlic, asafoetida and salt are dry roasted, then ground and added to the cooked banana and spices in a 4:1 ratio.

**Results**

Table 1 shows the comparison of the Benefit Cost Ratio (BCR) of various processed Banana products, such as Banana Fig, Powder, Squash, Nutrimix, and Pickle, versus unprocessed Bananas. The cost of Bananas at the farm gate ranged from Rs.15 to 25/kg depending on the variety. To make 50kg of Banana powder, 500kg of Bananas is needed. The BCR for the processed products showed that the highest BCR was for Banana Fig at 5, followed by Banana Pickle with a BCR of 2.5, then Banana squash and Nutrimix both with a BCR of 2, Banana powder at 1.9. The BCR for unprocessed Bananas was 1.5.

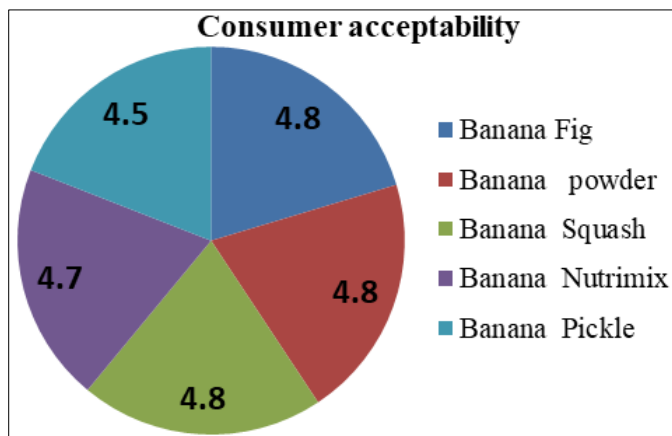
**Table 1:** BCR of various processed banana products

FLD- Banana Fig (DESI) Dehydration Techniques-Results							
Banana value added products	Production (Kg)	Gross Income	Gross Cost	Net Income (Rs.)	BCR	Consumer acceptability	Shelf life (days)
Banana Fig	50	25000	5000	20000	5	4.8	90
Banana powder	50	30,000	16000	14000	1.9	4.8	120
Banana Squash	50	4000	2000	2000	2	4.8	180
Banana Nutrimix	50	10000	5000	5000	2	4.7	120
Banana Pickle	50	10000	4000	6000	2.5	4.5	120
FP: Raw Banana	50 (Rs.30/kg)	1500	1000	500	1.5		3

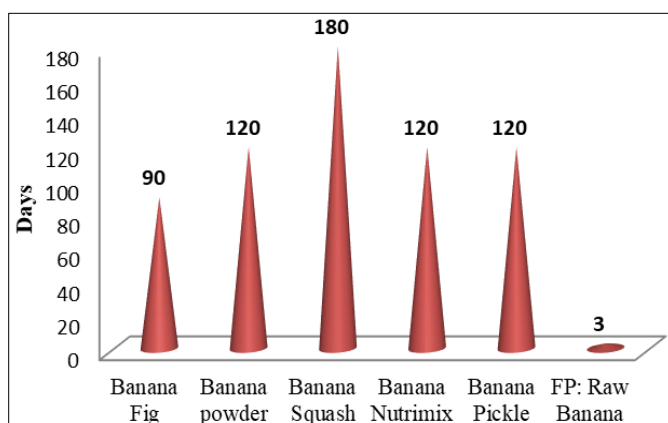


**Fig 1:** Benefit cost ratio of value-added Banana products vs Banana without processing

Figure 1 displays the BCR comparison of different processed Banana products compared to raw Bananas. Figure 2 shows the results of a sensory evaluation of the processed products conducted by 25 semi-trained panel members using a five-point hedonic scale. The panelists rated the products as very good, with high scores in terms of color and appearance, aroma, taste, texture, and overall acceptability, especially after storage for 270 days (0, 90, 180, and 270 days).



**Fig 2:** Mean Sensory Evaluation results – Overall acceptability of the different value added products developed from Bananas



**Fig 3:** Shelf life study of different value added products of Banana

Figure 3 displays the shelf life study of the processed Banana products compared to raw Bananas.

### Discussions

The perishable nature of bananas requires the need for appropriate processing techniques and product standardization. This will help in reducing waste and increase utilization, particularly during off-season. Adopting value-added technologies in bananas has the potential to increase income for women farmers and provide business opportunities for small-scale entrepreneurs. The processed products also have a longer shelf life and reduce marketing risks, leading to an overall increase in the standard of living for rural populations V. Saradha Ramadas, (2011) [3].

The farm gate price of bananas is considered to be between Rs.15 to 25/kg, while the market price is around Rs.30/kg. During peak periods, low prices often result in difficulties for farmers in terms of providing labour and transport costs, making it necessary to implement processing and value-added training for the farming community to improve their

knowledge of nutrition, post-harvest management, food processing and value-added techniques.

### Conclusion

The adoption of value-added techniques for Banana farming and small-scale Banana-based businesses can lead to greater profits compared to selling raw Bananas. This can help improve the economic situation of farmers in Tirunelveli and Tenkasi districts. These kinds of training programs give farmers the confidence to store processed Bananas for longer periods and provide consumers with a variety of processed foods like Banana Fig, Powder, Squash, Nutrimix, and Pickle throughout the year. Farmers should get involved in the food processing sector to reduce marketing risks during slow periods. There is a need for government and other stakeholders to support farmers with both knowledge and financing in the Banana agribusiness world.

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